DETAILED ACTION

1. This is the initial office action based on the national stage application filed on9/15/2006. Claims 1-16 as filed are considered here.

Priority

2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed on 09/15/2006.

Information Disclosure Statement

3. The Information Disclosure Statements filed on 9/15/2006 have been considered.

Oath/Declaration

4. The oath or declaration filed on 05/12/2009 is acceptable.

Drawings

5. The drawings particularly Figs. 2-4, and 6-9 are objected to because: Figs. 2-4, and 6-9 are same drawings that are repeated with different numbers as they do not properly explain the inventive subject matters and do not coincide with the description of the invention. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended

drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 4, 5, 6, 13-16 are rejected under 35 U.S.C. 102(b) as being anticipated by Chang et al (US 6,441,403; Chang hereinafter).

With regard to claim 1, Chang discloses a light emitting diode 10 (e.g. Fig.4B) including a substrate 12, a N-type semiconductor layer 26, an active layer 28 for generating light, and a P-type semiconductor layer 200, the light emitting diode 20 comprising: a first exposed region (region where 34 lies) formed by etching (col. 4, lines 4-6) the active layer 28 and the P-type semiconductor layer 200 to expose at least a part of the N-type semiconductor layer 26; a first ohmic electrode 34 formed on the first exposed layer 26; a second ohmic electrode 32 formed on the P-type semiconductor layer 200 and having an opening (opening due to rough surface where no ohmic electrode 32) at least a part of said P-type semiconductor layer 200 having a second exposed region (exposed region being where no ohmic electrode 32) through said opening; and said at least a part of P-type semiconductor layer 200 being provided with an ultra-fine prominence and depression structure (i.e. surface roughness structure of 200).

With regard to claim 4, Chang discloses the light emitting diode as claimed in claims 1, wherein the P-type semiconductor layer 200 is GaN doped with Mg (Fig.4B) the N-type semiconductor layer 26 is GaN doped with Si (Fig.4B0, and the active layer is GaN 28.

With regard to claims 5 and 6, Chang discloses light emitting diode 40, wherein the ultra-fine prominence and depression structure is a cluster of cylinder type prominence and depression elements (Fig. 4B) wherein the cylinder type prominence and depression element is a cone type (Fig.4B shows a cone type prominence and depression element).

With regard to claims 13-16, Chang discloses the limitations of the claim 5 but does not disclose wherein the cylinder type prominence and depression element is formed by depositing a metal or silicon compound on the semiconductor layer, heat-treating the deposited metal or silicon compound, and dry- or wet-etching the deposited metal or silicon compound; wherein the metal is any one or combinations selected from a group of Ag, Al, Au, Cr, In, Ni, Pd, Pt and Ti; wherein a temperature for the heat-treating is ranged from 90 ℃ to 400 ℃; wherein the cylinder type prominence and depression element is formed by selectivity, said selectivity being partly changed due to a reaction of the metal and the semiconductor at time of etching. However, Applicant's claims 13-16 do not distinguish over the Chang reference regardless of the process used to form prominence and depression element because only the final product is relevant, not the process of making such as "formed by depositing a metal or silicon compound, heat treating the deposited metal or silicon compound, and dry or wet etching deposited metal or silicon compound". Note that a "product by process claim" is directed to the product per se, no matter how actually made, In re Hirao,

190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and In re Marosi et al., 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in " product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above caselaw makes clear. See also MPEP 706.03(e).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chang in view of Ou et al (US 2005/0082562; Ou hereinafter).

With regard to claim 2, Chang discloses the light emitting diode as claimed in claim 1, wherein at least a part of the first exposed region excepting a portion having the first ohmic electrode has an ultra-fine prominence and depression

structure. However, e.g. Fig.6 of Ou discloses wherein at least a part of the first exposed region (region of 122) excepting a portion having the first ohmic electrode 16 has an ultra-fine prominence and depression structure 122. According to para[0028] of OU, due to the rough surfaces, the extraction efficiency of the emitting light is further improved. It would have been obvious to one having ordinary skill in the art at the time of the invention to include ultra-fine prominence and depression structure at least a part of the first exposed region excepting a portion having the first ohmic electrode to improve the extraction efficiency of the emitting light.

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ou in view of Oh et al (US 2004/0000670; Oh hereinafter).

With regard to claim 3, Ou discloses a light emitting diode 6 (Fig.6) including a substrate 10, a N-type semiconductor layer 12, an active layer 13 for generating light, a P-type semiconductor layer 14 comprising: a first exposed region (region of 122) formed by etching (para[0021]) the active layer 13 and the P-type semiconductor layer 14 to expose at least a part of the N-type semiconductor layer 12; a first ohmic electrode 16 formed on the first exposed layer (exposed layer of 12); and at least a part of said first exposed region (region of 122) excepting a portion having the first ohmic electrode 16 being provided with an ultra-fine prominence and depression structure 122.

As discussed above, OU discloses all of the limitations of claim 3 with the exception of a transparent metal (elecrtrode) and a metal pad for wire bonding. However, Oh discloses a transparence metal (electrode) 20 (claim 16 discloses Platinum which is same material as applicant disclosed), and a metal pad 20, 24 for wire bonding (para[0009]) of the light emitting device 10. According to para[0009] of Oh, bonding pads formed by the method of the invention adhere satisfactorily to the bonding wire and do not degrade the light transmission or ohmic property of the p-electrode. It would have been obvious to one having ordinary skill in the art at the time of the invention to substitute Ou's metal electrode with Oh's transparent metal electrode (platinum) and additionally include metal pad for adhering satisfactorily to the bonding wire and do not degrade the light transmission or ohmic property of the p-electrode.

9. Claims 7-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang.

With regard to claims 7 and 8, Chang discloses the limitations of the claim 5 but does not disclose wherein a width of the cylinder type prominence and depression element is 0.005 ~3 um, and a height is 0.1 ~ 1um or a width of the cylinder type prominence and depression element is 0.01 ~ 0.5 um, and a height is 0.2 ~0.7 um. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form such claimed width and height

of prominence and depression element through routine experimentation of the growth controlling parameters, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233. See also In re Peterson, 65 USPQ2d 1379.

With regard to claims 9 and 10, Chang discloses the limitations of the claim 5 but does not disclose wherein a width of the cylinder type prominence and depression element is 0.01 ~ 2 times larger than a peak wavelength of the light emitting diode, and a height is 0.5 - 10 times larger than the peak wavelength or wherein a width of the cylinder type prominence and depression element is 0.1 ~ 1 times larger than a peak wavelength of the light emitting diode, and a height is 1 ~ 3 times larger than the peak wavelength. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form such claimed width and height of prominence and depression element through routine experimentation of the growth controlling parameters, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233. See also In re Peterson, 65 USPQ2d 1379.

With regard to claims 11 and 12, Chang discloses the limitations of the claim 5 but does not disclose wherein a density of the cylinder type prominence and depression elements is 1 ~ 10000/um2 or wherein a density of the cylinder type prominence and depression elements is 50 ~ 500/um2. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form such claimed density of prominence and depression element through routine experimentation of the growth controlling parameters, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233. See also In re Peterson, 65 USPQ2d 1379

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to SELIM AHMED whose telephone number is (571)270-5025. The examiner can normally be reached on 9:00 AM-6:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Davienne Monbleau can be reached on (571)272-1945. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SELIM AHMED/
Examiner, Art Unit 2826